Analysis of the azimuth dependence of COT aging

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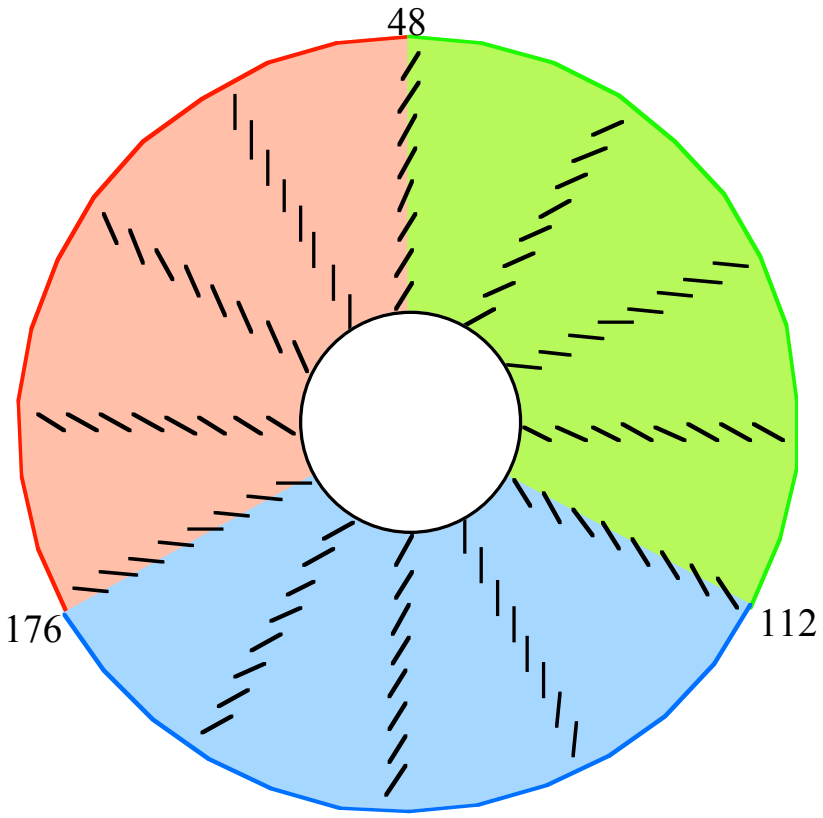
The most surprising thing about the aging plots produced by Kevin Burkett is the asymmetry between the aging in cells 176 – 48 and cells 48 – 112, which are in angular regions symmetric about the vertical axis. The asymmetry is particularly evident for Z< 0, i.e., near the gas inlet. The direction of the field sheets and wire planes has a rotation symmetry, but not a left-right symmetry. As viewed from the East end-plate using the same color coding as Kevin's plots, I've drawn a schematic picture of the COT, showing the direction of the field sheets in the figure below. My original attempt at this drawing had the rotation sense flipped, so my theory involving trapped gas between the field sheets did not fit. I think the drawing is correct now. A more consistent theory of the asymmetry is now evident.



For polymers to achieve a molecular weight sufficient to stick to the wires it is likely that multiple polymerization steps are required. The least amount of aging occurs in the region 48 – 112, where the polymers produced at one set of anodes cannot easily fall to the next set of anodes below. Instead they fall on the field sheets. However, in the top portion of the region 176 – 48, heavy polymers would have no trouble dropping down to the next anodes in a cell, or to the anodes in a lower cell. In general the aging is the worst at the bottom where the heavy polymers would concentrate.

This gravitational asymmetry, and perhaps the azimuth asymmetry, has been seen before, particularly in the DESY H1 central drift chamber.
www.desy.de/agingworkshop/preprints/pdf/niebuhr_english_and_ref_checked.pdf